

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-14 were pending. By the present response, claims 1 and 12 are amended, claim 11 has been canceled, and claims 15-16 have been added. Thus, upon entry of the present response, claims 1-10, and 12-15 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: page 4, lines 27-29; and Figures 2a-2b.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-14 stand rejected under 35 U.S.C. §103(a) as being obvious over WO 0154971 A1 to Varis (hereafter "*Varis*") in view of NO 10907 and GB 9792 (NO 10907 and GB 9792 collectively referred to herein as "*Parsons*") and further in view of SE 61072 to Akimoff (hereafter "*Akimoff*") on the grounds set forth in paragraph 4 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to an improved propulsion arrangement. In particular, the present invention is directed to an arrangement in a counterrotating propulsion (CRP) system. The unique nature of CRP systems presents specific engineering and design challenges. One unique problem associated with a CRP

system is an additional cavitation affect produced when the aft propulsion is pivoted, such as when a thruster is turned to steer a vessel, the aft propeller operates in the wake of the forward propeller while the aft propeller is turned at an angle relative to the forward propeller (see, e.g., page 1, lines 15-19 of the present specification).

This form of cavitation is sometimes referred to as "sheet cavitation." An arrangement constructed according to the present invention minimizes the harmful effects associated with hub vortex cavitation by arranging a well-streamlined hub after the forward propeller with flow plates being disposed on the hub (see, e.g., page 4, lines 17-20). An arrangement constructed according to the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

1. Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, the cap on the forward propeller having a length wherein at least two equally distributed flow plates are arranged on the cap of the forward propeller and that the flow plates are radially projecting from the cap, the flow plates on the whole length of the forward cap and link up to each other and extend beyond an aft facing end of the cap.

According to a further aspect, an arrangement formed according to the principles of the present invention is set forth in amended claim 12. Amended claim 12 recites:

*12. An arrangement comprising:
a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and
a forward propeller, and a second hub and a second cap associated with the forward propeller, the second cap having a diameter, the second cap having a length and comprising a plurality of equally spaced flow plates projecting from the*

second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;

wherein the aft propeller and the forward propeller have opposite directions of rotation;

wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and

wherein the flow plates are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller, the flow plates on the whole length of the second cap and link up to each other and extend beyond an aft facing end of the cap.

As evident from the above, claims 1 and 12 each require, *inter alia*, flow plates on the whole length of the forward (claim 1) or second (claim 12) cap. The grounds for rejection fail to even allege that the proposed three-reference combination discloses or suggests at least this aspect of the presently claimed invention. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

Moreover, as set forth in the Declaration Pursuant to 37 C.F.R. §1.132 filed December 8, 2008, one of ordinary skill in the art would have been led away from the proposed modification, involving increasing the surface area of the fins, the reason that increasing the surface area of the fins results in increased friction as the propeller rotates through the water. This increased friction increases the load on the propeller, thereby slowing the rotation thereof absent the application of additional power to rotate the propeller. Therefore, increasing the surface area of the fins possesses at least the disadvantage of decreased efficiency of the powertrain of the vessel. It is submitted that given the modern day costs of fuel for propelling such vessels, it is more important than ever that unnecessary losses of efficiency be avoided. Therefore, applicants respectfully submit that it would not have been

obvious to one of ordinary skill in the art to undertake the proposed modification of the fins of *Parsons* in view of *Akimoff*.

It is noted that on page 6, in paragraph 6 of the Official Action, it is asserted that the Declaration filed December 8, 2008 is insufficient to overcome the rejection of the previously presented claims 1-14 "because the prior art references cited in combination are considered to disclose the claimed features of applicant's invention." However, such commentary does not address the arguments presented.

Declaration evidence and arguments have been presented providing reasons why the proposed combination would not have been made in the first place, and would not render the claimed invention obvious. Should the rejection be maintained, applicants respectfully request that the substance of the Declaration filed December 8, 2008, and the arguments noted above, be addressed.

It is asserted in paragraph 4 of the Official Action that *Akimoff* discloses flow plates that link up to each other and extend beyond an aft-facing end of a propeller hub cap "which provides a streamlined flow plate configuration to guide water flow aft of the propeller hub cap." No portion of the *Akimoff* disclosure is cited in support of this assertion. Applicants have searched for an English language equivalent of *Akimoff*, and have uncovered a very similar disclosure by the same inventor in the form of Canadian Patent CA 245576, a copy of which is provided in the Information Disclosure Statement submitted concurrently herewith. CA '576 appears to disclose the same embodiments disclosed in *Akimoff*, as well as additional embodiments not disclosed therein. With respect to the commonly disclosed embodiments, applicants have searched the disclosure of CA '575, but find no disclosure which supports the Examiner's interpretation of the function of the fins or projections on the hub cap

disclosed by *Akimoff*. Thus, should the grounds for rejection be maintained, applicants respectfully request that a citation be provided in support of the above-quoted assertion, or a detailed explanation be given explaining why the alleged functionality of the flow plates of *Akimoff* must necessarily operate in the manner suggested in the grounds for rejection.

In addition, it is important to recognize that, in contrast to the unique problems associated with the operation of CRP propulsion systems, *Parsons* is directed to a single propeller arrangement. The unique problems associated with CRP systems are not present during operation of the single propeller system described by *Parsons*. Thus, for example, the disclosure of *Parsons* is of minimal relevance to one of ordinary skill in the art seeking to minimize the effects of the aforementioned "sheet cavitation" as well as the interaction between said sheet cavitation and other forms of cavitation which may be present in the operation of CRP systems. Thus, one of ordinary skill in the art seeking to modify the CRP system of *Varis*, such as in an attempt to minimize adverse consequences of complex cavitation effects experienced during operation of these systems, would not have viewed the teachings of *Parsons* as being particularly relevant to providing modifications which would be successful in eliminating or mitigating the aforementioned complex and interacting cavitation mechanisms. In other words, it would not have been obvious to one of ordinary skill in the art to have modified CRP system of *Varis* based on the teachings of a very rudimentary single propeller system as described in *Parsons*.

Since *Parsons* involves a single propeller, and not a forward and aft propeller system, there is no guidance provided whatsoever with regard to the teachings of

Parsons as to whether one should modify the forward or aft propeller of a CRP system such as that described by *Varis*.

Akimoff, like *Parsons*, is directed to a single propeller arrangement opposing a rudder. *Akimoff* also provides no guidance with respect to whether one should modify a forward or aft propeller of a CRP system such as that described by *Varis*.

For at least the reasons noted above, it would not have been obvious to have combined the teachings of *Varis*, *Parsons* and *Akimoff* in a manner such that the arrangements of the presently claimed invention would be produced, contrary to the assertions contained in the grounds for rejection.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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